THE OPTICAL

MAGIC LANTERN

JOURNAL

AND

PHOTOGRAPHIC ENLARGER.

EDITED BY J. HAY TAYLOR.

Vol. 5.—No. 58. [Entered at Stationers' Hall] MARCH 1, 1894. Price One Penny.

CONTENTS.

	PAGE
Notes	43
Are Lantern Stereotropes possible?	45
A Luminous Fountain	51
An Experiment	52
About Gas Cylinders	52
Size or Realism	55
The Lanternist's Den. No. XII.	57
Herepath's Polarising Plates	59
The First Lantern Show in the Royal Albert Hall	61
Editorial Table	61
Correspondence	62
Notes and Queries	64

Notices.

THE *Optical Magic Lantern Journal and Photographic Enlarger* is issued on the 1st of every month, price One Penny, and may be obtained from all Newsvendors, Railway News Stalls, Photographic Dealers, or from the Publishers, at the following rates, post free:—

		United States.
12 months	2/-	60 cents.
Single copies	-/2	6 ,,

Advertisements (Scale of Charges), displayed:—

	£	s.	d.
Front and back pages, by arrangement.			
Ordinary page (whole)	3	0	0
,, ,, (half)	1	15	0
,, ,, (quarter)	1	0	0
,, ,, (eighth)		10	0
,, ,, per 1 inch in column		6	0
,, ,, ,, ½ ,, ,,		3	0

EXCHANGE Column, General Wants, &c. (not Trade)—First 20 words, 6d.; and for every 3 additional words, 1d.

ADVERTISEMENTS must reach the office not later than the 24th of each month. All cheques and postal orders to be made payable to Taylor Brothers.

EDITORIAL communications must be addressed, J. HAY TAYLOR. Advertisements and business communications to **Taylor Brothers, 56, Chancery Lane, London, W.C.**

American Agents:—The International News Co., 83 and 85, Duane Street, New York City.

NOTICE.

MANY CORRESPONDENTS STILL FORWARD THEIR COMMUNICATIONS TO THE OLD ADDRESS. WILL THEY PLEASE NOTE THAT OUR ADDRESS IS

56, CHANCERY LANE, LONDON, W.C.

Notes.

THE manufacturing premises of Messrs. Platt and Witte were broken into on the 10th ult. Valuable parts of machinery, tools, &c., were stolen, together with lenses, gauges and various other goods. Besides much damage being done, showcases were smashed, doors forced open, locks wrenched off, desks and contents turned out and considerably overhauled.

* * *

IN the new catalogue issued by Messrs. Ross & Co., opticians, we observe that they have inserted the well-known reference table of distances, &c., for lantern work, which originally appeared in our columns, and that, insteadof acknowledging it to us, they prefer acknowledging it to *The British Journal of Photography Almanac*, of which they are the reputed proprietors. The editor of the *Almanac* however, when incorporating this table gives us due credit for same.

* * *

THAT yellow and blue will make white was lately demonstrated by Prof. Bidwell. He projected on a screen from an electric lantern a ray of pure yellow light, and on top of this another of pure blue, and instead of the mixture being, as might be supposed, green, it was white. Painters, he explained never got pure blue or pure yellow on their palettes; such pigments always contain green, and when the blue and yellow coalesce into white, the green comes out.

* * *

THE new electric projection lantern of J. B. Colt and Co., of Beckman-street, New York, is exciting considerable interest in the United States.

Compressed gases will now be allowed to travel by passenger train, either as consignments or as passengers' luggage, on condition that the cylinders properly packed in one of the undermentioned description of cases:—

1. Cases made of hemp.
2. Ordinary wooden boxes.

A consignment note must also be supplied in all cases when cylinders are forwarded as parcels, and must bear an endorsement by the sender as follows:—

"The cylinder used for this consignment complies with the conditions that it is made of wrought iron or steel of sufficient strength and efficiently tested."

* * *

Mr. Fred. Jas. Stedman, late of 174, Bridge-road, Battersea, has allied himself with Mr. T. H. Soper, and has lately purchased the extensive portrait studio of Denuelen, situated at 147, Strand, where, in addition to the usual portrait business, they have fitted up arrangements for producing transparencies from the negatives and prints of those who may wish to have fine work done by the collodion process, which process it is their intention to use exclusively in connection with the production of lantern slides. We have received some slides from them so made, and must say that they are exceedingly fine in detail; the tone produced is at the same time soft and brilliant, whilst possessing a rich and pleasing colour.

* * *

Mr. Jex Bardwell, 93, Cass-street, Detroit, Mich., U.S.A., writes: "My rooms are the headquarters of the Detroit Lantern Club. Catalogues of lanterns, slides, and photographic material might do the senders some good, if they please to send them to my address.

* * *

Camera Club Photographic Conference, 1894.—The 1894 Conference will be held in the Theatre of the Society of Arts (by kind permission of the Council), on April 23rd and 24th, under the presidency of Capt. W. De W. Abney, C.B., R.E., D.C.L., F.R.S., P.R.A.S. On Monday, April 23rd, at 3 p.m., the President will open the Conference at the Society of Arts, and papers will be read from 3 to 6 p.m. At 8 p.m. the Conference will be continued, and papers will be read from 8 to 10 p.m. On Tuesday, April 24th, at 3 p.m., the Conference will be renewed at the Society of Arts, and papers will be read from 3 to 6 p.m. In the evening a Lantern Slide Exhibition will be given in the Theatre of the Society of Arts, for which special tickets will be required, On Wednesday, April 25th, at 7.30 p.m., the Annual Dinner for members and friends will be held. The Members' Annual Exhibition of Photographs will be commenced at the Club on the first day of the Conference. A complete programme will be issued later and distributed. Visitors are cordially invited to attend and take part in the discussions at the Society of Arts.

* * *

Notwithstanding the recent dullness of business in general, the Eastman Photographic Materials Co. (Ltd.), have been able to declare dividend of 5 per cent for the past year.

* * *

Finding their premises in Southampton Row too small for their increasing business, the Platinotype Co. have removed to more commodious premises at 1, Charlotte Street, Bedford Square, W.C.

* * *

Since we announced the fact that we sent a cheque by the same post as that which carried the voucher copy to writers of practical articles, we have received a goodly supply of MSS. from which to select, and at the present time have several in type, amongst them being—"Printing-out Plates," "Lantern in Church," "Are Lantern Lectures Declining," "Enlarging by Day-light," "Experiments for Domestic Circle," "Humorous Lantern Slides," "The Optical System," "Supply of Oxygen to Flames," "My First Lantern Show," "Condensers," "Now Apparatus," "Simple Method of Registering Lanterns," "Lantern Experiments for Teachers, &c., &c.

* * *

We learn that the sets of slides "The Seasons," which have so effectively been given of late by Professor Kœnig, were designed and painted by Messrs. W. R. Hill & Son.

* * *

The first dinner of the Hackney Photographic Society took place at "The City Arms," St. Mary Axe, E.C., on the 22nd ult., under the presidency of Mr. F. Houghton. About sixty assembled at the festive board and spent a pleasant evening afterwards in the form of a smoking concert.

* * *

Just at the moment of going to press, Mr. Bishop Dockett called and left us samples of his new Easter slides, the colouring of which is executed in his usual excellent style.

* * *

Positive dry plates, a picture on which is ready to deliver in ten minutes, have just been introduced by Mr. W. Tylar, of Birmingham.

Are Lantern Stereotropes Possible?

THE following sketches will illustrate the particulars described in last issue on the above subject:—Fig. 1 represents the form of apparatus adopted by Mr. Colman Sellers; Fig. 2 illustrates the principle of viewing distant objects as though the eyes were a yard apart; whilst Fig. 3 is illustrative of the principles of Clerk Maxwell's modification of the stereoscope, which was brought before the notice of British Association 27 years ago.

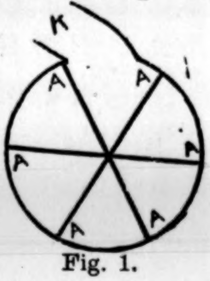


Fig. 1.

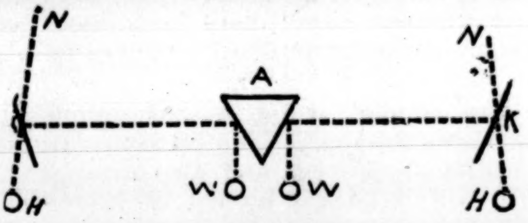


FIG. 2.

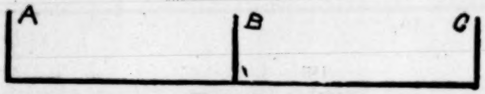


FIG. 3.

——:o:——

Discussion on Saturators.

(AT THE LANTERN SOCIETY.)

MR. J. HAY TAYLOR: What I propose saying about saturators will not occupy much time, for a short paper and a long discussion is, especially with this subject, better than a long paper and a short discussion. My remarks will, therefore, for the most part be made with the intention of getting such of you who, for some reason or other, have been afraid to use a saturator, to tell us the reasons why you do not, or will not use such an appliance for obtaining an illuminant for the lantern; and also that those who have found this means a convenient one for obtaining an illuminant, will give us the results of their experience.

I will briefly describe the principles of a saturator. Most of you know that a supply of one gas only is used, and that one oxygen; this supply is divided into two parts or streams, one part passing through material which has been saturated with, say, ether, the other stream being allowed to reach the burner of the jet in a pure state.

The saturated oxygen, when burned at the jet, gives a flame much the same as house gas, and it answers all the purposes of such in connection with the limelight. I suppose that I need hardly remind you, as I presume most of you are lanternists, that when a certain proportion of oxygen is mixed with the house gas or saturated oxygen, the well-known limelight is produced by allowing the flame from this to impinge on a lime.

Saturators of all dimensions and placed in various positions with regard to the lantern have been used with more or less success for some years past, and as ether, when cold, does not continue to give off the amount of vapour freely to saturate the oxygen, devices have from to time been resorted to, in order to keep the saturators at such a temperature as to ensure the ether with which they are charged giving off its vapour with sufficient freedom to keep the light at its best, and also to prevent pops.

At one time it was not uncommon to place a hot brick on the saturator, next we hear of hot water jackets which surrounded the apparatus; and then means for obtaining a supply of hot air round the saturator were advocated and used, a small lamp being placed between it and its outside jacket.

The saturators of the present day are kept warm in a very simple manner, by being placed inside of the lantern and imbibing its heat. This is so simple that one wonders it was not used originally; but then saturators, like most other things, have to grow or evolute, and although some of the saturators which you will see in action this evening appear as near perfection as possible, there is no knowing but that as the march of progress goes on, we may have something superior to even them, and that we may look back upon them as being clumsy and cumbersome methods of obtaining a light for the purpose of optical projection or other work.

We have here to-night a number of saturators, some of which will presently be lighted, and you will then see with what ease they can be controlled, and you will observe that, when a short interval is required, it is not necessary to turn the light out, but that it can be turned down. To do this we have simply to manipulate in the same manner as when using a mixed jet, viz., turn off the oxygen and lower the supply of hydrogen or saturated oxygen until such time as it is again necessary to proceed with the exhibition, when the gases are simply turned up again.

Now a word about pops or miniature explosions. So long as there is a good supply of ether vapour being given off, and the orifice of the nipple is not too large, pops are not to be expected, and I may here say that when such occur they generally arise from the pressure of the gas being diminished.

If the saturation is not complete we will find, on turning off the direct supply of oxygen, that the lime still remains incandescent. This denotes that there is sufficient free or non-saturated oxygen reaching the nipple to produce the requisite proportion to obtain incandescence.

Now, if we proceed to turn this out, we have a pop as soon as the pressure is reduced beyond a certain point. In the tube containing the gas we have an explosive mixture of gases, and when the pressure is taken off, it fires back and produces a pop; and according to the length and bore of the tube, so is the intensity of the explosion. When we light up the saturators I shall endeavour to produce the conditions for giving an explosion and shall try to obtain such, only it will be necessary for you to be very quiet at the time, as it will probably not be louder than the sound made were one to give a tap on the table with the end of a lead pencil. If saturation is complete, the saturated gas can be turned down to a mere bead, or in fact completely out, without the slightest sound whatever.

I have found that an informal conversational meeting under the guidance of a good chairman—such as we well know Mr. Nelson to be—conduces to much valuable information being obtained.

Some present have told me that they would on no account use a saturator, although it was their intention to be here to-night merely to listen to what was said, but they declined stating any reasons why they looked upon such apparatus with distrust. This is a little unfair, for if they are quite satisfied as to the great danger attending their use it is only right that they should point out to others what they consider to be the disadvantages or danger.

I think I have said enough to set the ball rolling, and would now hope that those who look upon them as dangerous will state their reasons for this belief, especially as we have among us the inventors or makers of most of the saturators, who, of course, know best about them.

I observe among the audience a gentleman who has often written against saturators. I refer to Mr. C. Goodwin Norton. Perhaps in course of discussion he will kindly give us his views on the subject. On the other hand, we have present Mr. Timberlake, who has had probably as much experience as anyone, having been experimenting in this line for five and twenty years. My reason for naming these two gentlemen is that we may make a commencement as soon as possible.

I will now try to give you an explosion, as I have endeavoured to arrange a saturator with the requisite conditions. You will observe that oxygen is passing through the ether (shown), yet there is a small incandescent spot on the lime, occasioned by the oxygen not being sufficiently saturated.

If we now turn out the light the chances are there will be an explosion. (After a short pause the explosion, which was just audible, occurred). There are a number of saturators on the table, the working of which will be described either by their owners or inventors, but I would explain in the absence of the inventor, that this (Gridiron) saturator is about to be made in a slightly different form; here is a model of it which is not quite finished. There is a nut which adjusts the lime nearer to or further from the nipple, while a nut immediately behind turns the lime. The Lawson saturator, in both its single form, and also arranged as a biunial, will be shown by Mr. W. Riley. There are one or two other forms of apparatus which have been placed upon the table by some of the audience, description of these, I presume, will be given by their owners; and now I expect that those who consider saturators dangerous will enlighten us, and in the discussion this evening I hope we may all be able to obtain interesting information.

Mr. C. G. Norton: It is hardly fair to ask me to support saturators, because Mr. Taylor knows I have had no experience with those which go into the lantern, my experience is with those of the old form. Some two years ago I illuminated a large advertisement board, and to do this used what was known, I think, as a double-barrelled saturator, and got a good light with it for upwards of an hour and a half. A policeman came along—he was not after me—and said, "What a fine light you have," but just at that instant there was an explosion like a small cannon. I went to see what was the matter, and found all the taps off, and something wrong with the regulator. Now I never understood why the saturator exploded; I used it about thirteen or fourteen times to illuminate this advertisement board, and had no explosions until this one. What struck me was this: A few nights after I had an entertainment to give to children, and supposing I had used the saturator inside the hall! As far as I can see it would not have hurt the children, but still some of them might possibly have been frightened. I have nothing to say against the use of the saturator amongst gentlemen who are quite fearless, but what I do say is that, as regards the old form of saturator, it should not be used where danger might arise from a panic.

I believe it is usual with these old forms of saturators to turn out the hydrogen, that is the mixed gases of ether and oxygen, first, and that that would prevent an explosion. I thought I would try this plan. I turned out the etherised oxgen and I heard something crack, which was a valuable six-inch condenser, the cold oxygen playing on the lime caused this.

Now when I use a saturator I turn out both together, but I never have used a saturator in a hall, and at present I won't do so. I do use a saturator sometimes, because the gas company charge so much. I am obliged to economise and drive my hydrogen through the saturator. About 5 feet will make up to 15 feet, taking up 10 feet of ether vapour as it passes through. But there is even some slight danger here. I was down at Ely and sent a boy out for a pennyworth of benzoline; he got it, and thought he would fill the saturator with it when I was not present. He is about 14, and smokes sometimes—when no one is about. He thought he would have a cigarette, and struck a light, and I was told that the flames went up about 14 feet. I suppose it was only half this—that would be 7. He burnt a hole in the floor, and also burnt some curtains which he threw over the flames. That is one of the dangers in using benzoline. If it had been ether, which is much more inflammable, things might have been worse. The vapour is heavier than common air, and will rise up and flow over the bottle, and if you go down on your hands on the floor you can smell it.

Again, ether may not be carried by rail, at all events by passenger train; some day there might be an accident, and the penalty by taking it by rail is £20.

Again, I fail to see the advantage except to augment the supply of hydrogen. Gas is now so cheap—and I hear the whisper that a new company is to be started to give us gas at about 3s. 6d. a thousand feet. You must have one cylinder under any circumstances. Ether does not cost very much; we use about four pennyworth during an exhibition. Why not use the extra cylinder then?

There was one other thing I forgot to tell you about saturators. I went to a shop and bought one. On my way home I thought I would get it filled. The man took it inside, and came rushing out again in a few minutes; there was a small pin-hole, and the ether was coming out. Now, suppose that happened when it was alight! It is quite bad enough when the nozzle is burnt out; but what if it were an ether saturator; who would put the fire out then? I must say that I have had no experience with the new forms of saturator, my objection to them is using ether at all, and if I could afford it I would not use it to augment the supply of hydrogen.

MR. THOS. TIMBERLAKE: I can only say that I have had twenty-five years' experience with saturators, and I do not use mixed gases unless I am obliged to do so. I can obtain a greater light with less trouble, and a larger degree of safety with a saturator than I can with a mixed jet.

The first apparatus that I attempted to produce was this one—a ½ lb. coffee canister with two pipes, inside there is a piece of sponge. I filled it with benzoline and blew through it, and the amount of flame coming out brought to my mind the fact that, at that time, benzoline was said to be the light of the future. Consequently this lead me to try the experiment of augmenting the supply of gas to the lantern, but I never got a satisfactory light by means of benzoline and house gas.

I next tried dipping a flannel in warm water and wrapping it round the canister. This succeeded fairly well, but the heat was intense. After that I started in another direction; I endeavoured, though I had never seen a saturator, to construct an article I should be able to heat where there was a fire, and this (holding it up) is the one—across it there are certain compartments in a zig-zag, and there is a wick coming from the bottom to the top, which induces a succession of the flow from the bottom to the top.

This answered very well, but I found the pops a terrible nuisance. I have had more than one that anybody in the room could hear without requiring to be quiet (as in Mr. Taylor's case). To a great degree these were owing to a cooling of a moisture in the pipes. I shortened them and found it better when I used hot bricks, but the bricks would get cold, so then I thought I would get a bucket of hot water, and I made a can with round compartments and put this in a bucket of hot water. However, I found the same difficulty, the vapours would condense in the pipes. Afterwards I tried one with warm air—here is a canister of that kind which I will show you—standing that on anything convenient and putting a lamp underneath, it produces a warm jacket of air right round, which keeps it beautifully warm. I had no pops except when I turned the light off too rapidly, in which case there would be a small pop.

Well, after I had tried these I went on with another one, a 6d. tin boiler turned upside down, now inside there is a vessel which has seen good service. With one of these I had the nearest chance of an accident; the saturator had got somewhat cold through not being used, and my man was terribly frightened of saturators. The consequence was that he fumbled about when he was turning off the lights, and turned off the hydrogen. There was a loud report, but no fire.

I have burst more than one or two saturators. This one (see illustration in OPTICAL MAGIC LANTERN JOURNAL, September, 1893, Fig. 2.) was, to my expectations, as near as I could get with benzoline. The small lamp produces sufficient heat to render the benzoline of commerce volatile if you can keep up a sufficient supply of hydro-carbon.

When I constructed this one, finding it a great improvement, it encouraged me to go on again. It has a jacket containing the warm air, which is kept hot by a little lamp. The four tubes are all communicating, and on the top was fixed the **T** piece. The jets were the main difficulty, they would spit out, which caused a little flare. I let it burn itself out.

My next idea was that we should have some method of warming which would not require constant attention, so I produced this one (illustrated in OPTICAL MAGIC LANTERN JOURNAL, September, 1893, Fig. 1,) which consists of two tubes; they are packed and the packing is held up by wire gauze; there is a shield and you could use any ordinary jet; the flexible tube connection was, however, not good, and the next thing I produced is my latest saturator. I have patented it, and, therefore, feel free to show it in public. I put a small nut on the top of the lime pin to prevent the lime from falling off, as I will invert it. I generally use an automatic regulator. I once bought a saturator said to be perfect, but it did not appear to be so, for it blew to pieces, and some people told me it would blow me to pieces with it. But the effect was to make me more determined than ever to overcome the difficulty. Let us all have a try and see what we can do to find something which will be free from all the objections Mr. Norton has urged against saturators.

Here Mr. Timberlake proceeded to experiment, and said, "I will see if I can get a good light. I now produce what I call a forced light, now provided anything could go wrong it would surely occur now. You can lay it upside down, or do anything you please with it, and it can hardly be forced more than it is being forced now. Of course you can regulate it to any desired extent (regulation shown). As far as I am concerned it is not a perfect apparatus, although I have patented it, but you will probably say that it is safe enough."

Mr. E. Baker, of Salisbury:—"May I ask if you can get a quiet light with that?" to which Mr. Timberlake replied "I shall be pleased to show you a quiet light." "May I ask what is the illuminating power?" "800 power, that is a very large one for general use, and I have a smaller nipple one which I can fit on."

Mr. W. Riley, of Bradford: I am sorry that Mr. Lawson, the original inventor and patentee of the "Lawson apparatus" is not able to be present; but I can speak for those who have been using the saturator night after night during the season, and who would be able to testify that they have never been able to produce any pop which could startle the audience. The "Lawson" saturator claims to be the simplest lime-light apparatus that can be imagined, there is but one tap to be manipulated, there are not several taps by which one can be confused. We will now light it up and show you the mode of setting the thing going, and then will show you the bi-unial saturator, which has only just been perfected. First of all, when the manipulation is adjusted as to height of nipple for any lantern, it is done for all time; you can of course lock the nipple when it is in position. Perhaps the greatest objection to saturators is that it is sometimes very trying to pour the ether very gently into the narrow orifice, but this is a mere detail.

As to its safety—We have now sold somewhere about 350 of these saturators, there is no secret about it, and many have been sold to people with no experience of lime-light or lantern work in any shape or form.

Of course saturators are a great advantage where the house gas is not to be obtained, and scores of people have written saying they have never before been able to use lime-light because of the cost. Many of the lime-light lectures in small places are entirely dependent on the proceeds, which are frequently very small indeed; and when they can have the light for about 4d. it is convenient to use this form of lime-light.

Out of all these cases we have not had a single complaint of any accident or scare resulting from their use. On the other hand, there have been gentlemen using them night after night and they have had no hitch. That speaks for a safe saturator, and I do not think it safe to contrast the new form with the antiquated barrel saturator

We have certainly had pops with modern saturators, but no serious accidents; the objection alleged against their use is that of affecting the audience who are soon frightened. Still there are lecturers like Professor Malden and others who fire pistols for effect, &c.

With this as Mr. Taylor showed, it is difficult to get even a slight pop. When we light the saturator at first the tap is nearly in a line with the nozzle, and the way to mix the gases is to turn the handle a little way to the right. It is so simple that we know of many cases where boys of about twelve are using the apparatus regularly.

Mr. J. H. Barton (of Manchester): Can you turn the light very low?

"It can be done with turning it to the left, then you have to admit the pure oxygen again."

Mr. Riley proceeded: The only time when a liability to pop occurs is when the ether is becoming exhausted, but as a general thing it is difficult to produce a pop.

Mr. Baker (Salisbury); What kind of regulator do you use?

An automatic one.

How have you the front valve?

If you adjust the screw below the nipple it it modifies the pressure.

But you cannot do so in the lantern?

No.

May I ask how much you reckon to unscrew this from the original condition?

Half way round, often. It varies so much in the screws.

Do you not think it would be an improvement to have T pieces?

We are making them for next season with a milled head, for they sometimes get broken off; people turn them in instead of turning them out.

Now see the double saturator in the operation of dissolving. It has been one of the greatest difficulties so far, but this dissolves without any pop.

Prof. Koenig; May I ask if you use an ordinary dissolver?

No; any of you can see the dissolver at work; it is fixed at the back; there is one dissolving tap with one small screw tap, when once fixed, that rarely needs to be altered.

Mr. R. Smith; If you have both lights on, have you to increase the pressure of the oxygen?

Not if you use an automatic regulator.

Prof. Koenig: Can the single saturator be used with an automatic regulator?

Yes, by adjusting the screw below the nipple to the strength of the regular spring.

Mr. Woolf; Would there be any likelihood of the interior tubes clogging?

No, I think not.

Mr. E. Baker: Does it work equally well with benzoline?

We don't use benzoline at all.

If you did use benzoline, the ordinary would do, I suppose?

A Visitor: I was using ordinary benzoline with a saturator, and I think it ought to be put on the instructions that you should be careful. I took it home and put it in and had some big pops which nearly knocked the bottom of the saturator out. Afterwards it appeared there was some oil in the funnel with which they poured the benzoline in.

Mr. E. Baker: Have you tried gasoline at all?

Mr. Riley: No, we have not.

Mr. R. R. Beard: I have had a little experience with saturators, but my experience is much more with this form of saturator (Broughton tank). It was invented, I believe, or brought out before the public by the late Rev. Mr. Hardwich. I have used this now successfully for nine years, and have never had a hitch. I have used it with a bi-unial and with a single. I used it quite in the open without any heating apparatus. I think accidents which have happened with the ether saturators have occurred with the triple lantern. I remember once a saturator of this description was supplied to a railway porter who bought a triple lantern and wanted to use something cheap. Of course ether was cheap, and he had one of these saturators; but I told him not to use it for the triple lantern, but if he did he was to keep it well charged with ether. Three weeks after he had blown the taps out, but no damage was done. This saturator (Gridiron) was sent to me by a gentleman to test for him, and the first thing I did was to blow about ten feet of oxygen through it. He told me it had not been used, so I exhausted it, and when I had passed oxygen into it I shut it off and thought I should get an explosive mixture. When I applied a light to the nozzle it only gave a little snap. I made it hot and got a flame about eighteen inches long, but got nothing more. Then I passed oxygen into it, and of course it rapidly cooled it. Then I suddenly shut off the oxygen supply and simply got a snap. I wanted to burst the thing, but could not; it merely went out, so I thought it was perfectly safe; but I still prefer my own kind, I can use it for three hours and it is perfectly safe in my hands. Another experience was with Mr. Donkin. In coming round to me behind the lanterns, he put his foot on the oxygen supply. Of course I heard a snap in the lantern, but nothing else happened. He took his foot off and said: "I will use ether myself in future." Next week he took it down to Cambridge with him and all was satisfactory. It gave me confidence in the ether saturator of that form, but at the same time I do not see that for persons, say in London, there is any need for them. Give me a pair of cylinders and I think it quite safe. If an instrument of the saturator class were to explode, what would occur? I think there should be a safety valve of some description. I have had a Scott saturator, and I have had the cork blown out and got a flame ten or twelve feet high. It goes out quickly—so do the people as a rule. But you don't want that sort of thing in a public exhibition.

There is no need for people to use more than four feet an hour of ordinary gas, and I think it is a matter of cost. It ether cannot be carried by rail under a penalty of £20, where do country people get it from? When I did use it—I have not done so since last September—it cost me something like 1s. 6d. a pint, and it was quite sufficient to give me all the light I wanted.

Mr. Riley: Ether can be sent by rail; we are constantly doing so.

Mr. C. G. Norton: Would Mr. Beard mind explaining how he works the two lanterns with the Broughton tank?

Mr. R. R. Beard: Just the same as an ordinary lantern. You take this tube (pointing) to the one inlet, and this to the inlet of the hydrogen side of the dissolver, and you light up in the ordinary way. There is no difficulty whatever. When turning the ether out, I turn off the oxygen at the jet and then the ether at the tank. I keep a constant pressure behind the ether, then I know there is no flame which can come back, for when you stop your supply you let the flame travel back. It is packed with a lot of asbestos and such like, and I used to use the pumice tube of Professor Harwood.

I found, in passing the mixed gases through pumice of that description, it gives a yellow tinge to the light; in the ether I saw no difference in the flame.

Mr. W. H. Harrison: I should like to say that if I had a saturator which did not blow up, I should like to know the reason why. I think those who, like myself, know very little about ether saturators would have been pleased if we had been given a few sketches on a black board.

Mr. R. R. Beard: I should like to try and give an answer to the question "Why saturators do not blow up?" I think it is because they are packed with asbestos sponge, and it is well known that the flames do not go into the pores of this arrangement. Oxygen and hydrogen mixed, of course, will almost always explode, but it was found that pumice prevented the flame from getting from one side to another. I think this is the reason. I have never used a saturator when I could have had gas. I felt that with a pair of oxygen cylinders, I could obtain a splendid light, although this evening I have seen some beautiful results, and I think I may be inclined to adopt it more largely than I have done. I feel convinced the element of danger is not sc large as it has been made to appear. I have never had an accident of any kind. I have taken every precaution.

After some more discussion ably carried on by Messrs. Golding and others,

Mr. Norton said: With regard to the saturators being stuffed, I have seen three saturators which were stuffed, which have blown up; two with the tubes blown off, and the other had the barrel spread like a book.

Automatic valves have been discarded many years ago, because they have been found useless. They may do with ether saturators, but not with a mixed jet. The only accident I had was on a Good-Friday, when I suppose I ought not to have been using the lantern. I was, however, amusing the children. I think I was showing them Scripture slides, and I turned the tap off and the gas went back through the bag which was burning, and yet the tap was turned off. I subsequently submitted that to Mr. Beard. I asked him the question, and he said it was a bad tap and was not made by him. And now with regard to this 800-candle power, it is difficult to judge of this. I have a jet at home of which I don't know the power. I should like to try this jet beside the 800-candle power ether saturators.

There is one thing I wish to ask—how the light is centred by the double saturator. I suppose there are some means of tilting it up or down; this was not pointed out.

Mr. W. Riley: The nipple screws up or down, and any side movement can be governed by the jointed rod.

Mr. Ware: Do you turn the nipple round when the light is on; if so, how about the condenser?

Mr. W. Riley: If it was my condenser I should not turn it on so that the light touched it. If you once get this adjusted it is right for future use with the same lantern; it may be a little trouble at the start. There is, however, no great difficulty about this; we find that we can gauge it pretty well, but I admit that it is more difficult to centre it than with the ordinary jet.

Mr. J. H. Barton, of Manchester: After the experiments, it seems pretty conclusive to me that we get the light better at all events than with the ordinary jets; I cannot think but that if the gas companies would sell their gas at reasonable prices anyone would use saturators. I would prefer to have two gases, and I cannot perceive of anything more convenient than one small cylinder containing gas. The difficulty is that you cannot get the gas under 3½d. or 4d. per foot; but if the companies were to reduce their charge, where would the saturators be?

After further discussion, in which argument Mr. Kœnig and Mr. Golding took prominent parts, Mr. E. M. Nelson summed up as follows: We have had a most interesting exhibition of these saturators, and certainly we have had a number of pranks played with them. I cannot say I can give you any personal experience, never having used one, but I have used oxy-hydrogen. I have always used a mixed jet and had no accident.

I think we have here before us very valuable apparatus, which I should like to use in country places, and should not have the slightest hesitation in doing so, though I was nervous formerly. Now, I would certainly not be afraid to use any of these apparatus, and I think it a great advantage in far-off country places, where there are large expenses. The carriage and freight of gas cylinders is a very large item.

I should certainly not have any hesitation in using a saturator after what I have seen to-night. I think it is a very valuable invention for the lantern. I am highly gratified at seeing so many people here, and we have had a most interesting and pleasant discussion on this subject.

Owing to the lateness of the hour, Mr. J. Hay Taylor was not called upon to reply to the various speakers.

——:o:——

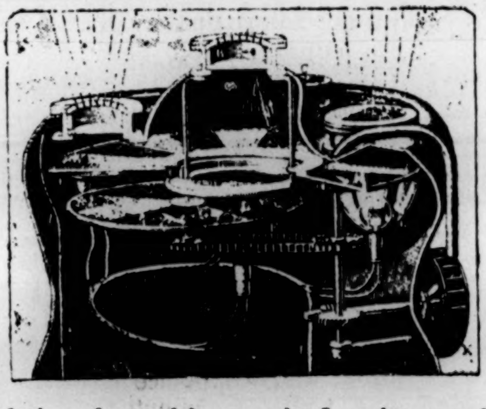
A Luminous Fountain.

Mr. Gustave Trouve's luminous drawing room fountains were described by us (*La Nature*) at the time of their presentation to the Academy of Sciences, The simplicity of the mechanism and the direct and powerful illumination of the liquid wheat sheaf jets permitted of reducing them to so small dimensions that the inventor, in addition to his drawing room model, constructed luminous fountains of demonstrations for cabinets of physics and even table fountains. The same advantages were likewise to facilitate the construction of monumental luminous fountains. As the jets of water are entirely united in the luminous pencil directed by a parabolic projector of a very sharp curvature, it will be conceived that with an adequate electric source the dimensions of the fountains may be as large as one desires; and, since such source may always be given the intensity desired, one will find himself practically arrested only by the rapidly-increasing difficulty of submitting great masses of water to considerable pressure. Such a fountain adorns the winter conservatory of the magnificent Craig-y-Nos Castle in Wales, the royal home of Madame Adelina Patti Nicolini, the great cantatrice.

This fountain, which weighs ten thousand kilogrammes, and is placed in a basin of water six meters in diameter, is automatic. The water that falls back into the basin is led by a discharge pipe to a small overshot wheel, which through the intermedium of an endless screw and a train of wheels actuates two circular screens with sectors of variously coloured glasses. These two screens, one of them mounted centrally upon rollers and the other eccentrically, revolve in opposite directions, with equal or unequal velocities, as may be desired. To sixty revolutions of the bucket wheel corresponds about one revolution of the discs. The combination of the double rotation and of screens with multiple colours is a happy one, in that the effects of light obtained are very unexpected.

The aspect of the jets, in turn monochromatic and polychromatic, and incessantly varied, like the figures of a kaleidoscope, seem always new.

The automaticity of the great condensation of the light at the focus of the reflector accommodated itself better to incandescent than to arc lighting, but this required quite small although very powerful lamps. To this effect, Mr. Trouve has bent the carbon filiment into a spring of five or six spirals. The luminous power, concentrated into a very small space, is thus quite sufficient and easy to place at the centre of the reflector. In the present case, the electromotive force being 110 volts and six amperes, the consumption of one lamp is at the rate of one candle per three watts, and of 220 candles per lamp, say 880 for the four lamps.



Precautions have been taken to prevent ram strokes upon the glasses on the entrance of the water. A bell glass placed in the interior of the rock is branched upon the conduit, and the cushion of air obtained so deadens the blow that no break is to be feared. The thickness of the glasses is twenty-five millimeters and their diameter 300.

The illustration shows the arrangement of the glasses, screens and reflectors. These new fountains require no maintenance; a cock is turned, the water enters and the circuit is closed simultaneously. The cost of installation likewise is reduced to a minimum. There is no subterranean foundation work, and any basin can be used just as it is. The whole of the expense is therefore reserved exclusively for the decoration.

———:o:———

An Experiment.

Write with acetate of cobalt or with muriate of cobalt previously purified from the iron which it generally contains. When the writing has become dry these letters will be invisible, warm the paper a little and the writing will become a beautiful blue.

———:o:———

About Gas Cylinders.

(*Continued from p.* 37.)

No. 1 cylinder was twice raised to a height of 35 ft. and dropped horizontally upon a solid iron block 12 in. square, each blow bending the cylinder to an extent of about three-quarters of an inch. It was then dropped vertically on its spherical end, having a clear fall of 31 ft., when it was found that the impact had only flattened a part about the size of a penny piece. It was crushed with a fifteen-tons blow, received while it lay across an iron block, and it was finally bent with the same blow into the shape shown, whilst it was supported on two anvils set 4 ft. apart.

No 2 cylinder was dropped horizontally across an anvil five times from a height of 35 ft., receiving the blow each time on the same spot.

No. 3 was dropped twice from a height of 35 ft., and then crushed into the shape shown by a fifteen-tons blow. On these cylinders being subsequently gauged, they were found to contain the full quantity of gas.

I need make no further comments on these remarkable tests, but will pass on to consider secondly the solid-drawn type of cylinder. The interesting experiments recently conducted by Professor Goodman, of the Yorkshire College, Leeds, were exclusively on this type of cylinder, and it is one special make of solid-drawn cylinders which has become discredited since the Bradford accident, and which the oxygen companies, for reasons to which I shall refer, have now at length decided not to fill. The question of the safety of cylinders for rough handling turns largely on their annealing. In describing their construction, I said that, after being finally drawn cold through the last die, they were carefully annealed, in order to restore the metal to its original state of ductility. To do this, the cylinders, before leaving the maker's works, are heated to a dull-red heat in a suitable furnace, and then allowed to cool down slowing in another chamber. This point of annealing in connection with solid-drawn cylinders is one which the Brin's Company have never disregarded, and we have from time to time made experiments on new cylinders just to prove the maker's *bona fides* in this and other respects, and I may say at once that, until the Bradford accident, we have never had occasion to question the care or skill with which all makers of this class of cylinders have conducted their business.

Professor Goodman, by his tests on fragments of the exploded cylinder, proved beyond question, as stated at the coroner's inquest, that the Bradford accident was due, primarily, to the cylinder not having been annealed, and one of the most serious features of the case was that it had passed the tests of an oxygen company, and had been filled with gas by them in the firm belief that it was safe for use. In short the accident showed that with all the tests employed by the compressing companies, it was possible for an unannealed, and consequently unreliable, cylinder to get into circulation, and it has served at least one useful purpose, inasmuch as it has proved the necessity for the adoption of re-annealing as an additional safeguard.

The cylinder which exploded at Bradford, however, was proved to be not only unannealed, but also of unsuitable metal, and the natural question it gave rise to was this, If makers can send out one cylinder of this kind, why not more? The oxygen companies were placed in an awkward position by the accident. If they continued to fill cylinders of this particular make after the facts which came to light at the inquest, they assumed grave responsibilities. If, on the other hand, they refused to do so, they would cause many of their customers serious inconvenience and loss, and might further do unwarrantable injury to the business of the cylinder makers in question. All these points were seriously considered, and I am convinced that we adopted the only fair and rational course. Some day, should the necessity for our doing so arise, or should the makers at any time demand it, we are ready to make publicour reason for definitely refusing to fill any of the cylinders of this make which are now in the trade. Meanwhile, I need only state that, in adopting this course, we have acted not through any of the motives of hostility which have been attributed to us by some, nor even on our own judgment alone, but on the unhesitating recommendation of a well-known and absolutely impartial expert, in whose hands we placed the matter for decision. Owners of these cylinders have said to me, "You make a lot of fuss about one particular make. Have you evidence to prove that the other solid-drawn cylinders are safe?" My answer is "Plenty." The first requisite of a solid-drawn cylinder, just as much as a lap-welder one, is a ductile metal, and there is an accumulation of evidence to prove that these cylinders fulfil that condition.

I hardly like to conjecture on the number which have been filled by the Brin Company, but it is many thousands, and, so far, there has never been an accident with them. Further than this, as I have already stated, we have at intervals destroyed these cylinders, just to test the ductility of the metal, and I have never met with an instance in which the results were unsatisfactory. The figures I have already quoted are based on these tests, and they are, in themselves, evidence of the suitable character of the metal. Perhaps, however, the best evidence of all is the test made by Professor Goodman on one of these cylinders in his recent investigations. The cylinder was one which happened to be at the Yorkshire College at the time, and I will quote from his report:—

> 'The cylinder when fully charged with oxygen was dropped through a height of 22ft. on to a block of cast iron. It alighted on its bottom end, and was very slightly indented, so slightly that few were able to detect the dent until it was pointed out. After discharging the oxygen, the cylinder was subjected to an internal hydraulic pressure of two tons per square inch, which was left on for about a quarter of an hour. No bulging or distortion could be detected by careful measurements. The cylinder was then considered safe, and was returned to the Oxygen Company to be refilled. On its return the cylinder was again dropped through a height of 22ft. and another very slight dent produced. The cylinder was then taken to the top of the Engineering Department of the College, and was twice dropped through a height of 50ft. The first time it alighted on a sharp corner of the cast iron block, and the second time on the flat surface of the block; the only result of the dropping was to produce two small dents. The cylinder was then laid flat on the table of the testing machine, and a sharp V-block pressed into it with hydraulic pressure in order to find to what depth the cylinder might be dented before giving way. The pressure was gradually increased until the cylinder (4ins. diameter) was squeezed almost flat, and the V-block had made a dent two and a quarter inches deep; it then suddenly tore apart along both sides, producing a loud report, but without dislodging a single loose fragment. The cylinder, although torn, is still in one piece. Thus, if such a cylinder had been accidentally burst by a railway collision or otherwise, the probability is that no one would have been hurt. Every precaution was taken to prevent personal injury when the experiment was made by packing it round with bagging and timber. The former caught fire when the rupture took place.'

I don't think better evidence than this of the reliability of properly constructed solid-drawn cylinders could be found. Our determination to reanneal them at intervals of three or four years is simply the outcome of the lesson taught by the Bradford accident. It is an additional and inexpensive precaution, and one of which the makers themselves approve.

I will now turn to the methods we employ for ensuring the reliability of cylinders before filling them with gas.

Every cylinder, when it is delivered at the works, is first examined to see if it bears the Company's test marks. If it does not, we know that the cylinder has never previously been filled by us, and it is at once sent into the testing shop. There it is first examined and weighed in order to discover the type and approximate thickness. If these are satisfactory, it is charged with water and tested hydraulically to a pressure of one and a half tons in a special apparatus, by means of which the effect of the hydraulic test is registered. The principal object of the apparatus is to test the elastic limit of the metal of the cylinder. If the hydraulic test strains the metal beyond this limit, it is at once registered on an indicating tube, and the cylinder is condemned. If, however, as in the great majority of cases, where cylinders have passed the weight test no permanent stretch is registered, the cylinder is considered satisfactory, and it is stamped on the neck and valve with the Company's test mark. Under the test mark on the valve a figure denoting the year of the test is stamped, and, finally, if it already bears a number, that number and other particulars, such as exact date of test, owner, and type of cylinder, are registered in a test-book; or, if it bears no number, a number is given to it, and similar entries made in the test-book. After that the cylinder is sent to the factory and filled, and, as far as the Company is concerned, it is considered safe for any amount of use during a period not exceeding two years, at the end of which time they consider it desirable to retest the cylinder. When it has been retested and proved satisfactory, another figure, denoting year of re-test, is entered in the test-book, and so on, until, I believe, a very remote period, when the cylinder will ultimately give out under the hydraulic test. It is hardly necessary to add that it is only a small percentage of the cylinders delivered at the works daily that require to be treated this way. In the majority of cases they already bear the Company's test mark and the figure indicating that they have been tested within two years. In such cases hey are sent direct into the factory to be filled.

A great deal has been said since the Bradford accident about the folly of employing very high test pressures in the belief that they ensure further safety. In justice to myself, and to show that this is no new theory, I venture to quote from a chapter on my recent *Handbook on Compressed Oxygen*, which was in print at the time the accident took place.

In describing our method of testing cylinders I write as follows :—

> 'Every cylinder which enters the company's works is subjected, before being filled for the first time with gas, to a hydraulic test pressure of 1½ tons per square inch. which is practically double the pressure to which it is afterwards charged with gas. This pressure causes a tensile strain in the cylinder, which is well within the elastic limit of the metal, so that no possible injury in the form of 'permanent stretch' can be occasioned. This question of elastic limit of metal is one which some dealers are too prone to overlook, they are inclined to think that the higher the test pressure applied to a cylinder, the more confident they can be of the safety of that cylinder for future use. Such, however, is not the case. It is no more reasonable to overstrain a cylinder by hydraulic testing than it is to overstrain any other structure, and although it is a fact that in nine cases out of ten these cylinders would bear a pressure of two tons per square inch without any appreciable 'permanent stretch,' it is none the less a fact that such a test is high for the elastic limit of the metal, and consequently open to objection. It is far better to test to a reasonable standard pressure of 1½ tons per square inch, and to repeat that test at intervals of one, or at most two years, than to go higher, and then rest satisfied as to the soundness of the cylinder.'

The recommendation in Professor Goodman's report, 'That the high test pressure now adopted should be reduced,' did not apply to our test pressure; and I believe one tons per square inch is now adopted as the standard test throughout the trade. I may perhaps add that should any gentleman present happen to be the owner of a two-ton tested cylinder he need have no anxiety about its safety on that account, for even if it has been at all strained under this needlessly high test, reannealing will get over the difficulty, as it removes the effects of overstrain, or fatigue of metal. I have already referred to reannealing as an additional precaution which the company has recently adopted. We have erected a special furnace for doing the work, and are making it a rule to reanneal all cylinders at intervals of about four years. All cylinders now in use will be gradually heated in this way, subject to the owner's consent, and as far as possible at his convenience, and once the system is properly established, cylinders can be reannealed before every alternative hydraulic test, so that no additional inconvenience will be caused by the regulation.

It is, perhaps, desirable that I should refer more fully to the weight test, which is one which the Company has recently adopted. Its primary object, as I have already mentioned, is to detect, approximately, the thickness of cylinders sent in by private owners to be filled. We have fixed on certain minimum weights for the different types and sizes of cylinders, which just allow of the thicknesses I have already mentioned, if the metal is uniform throughout. Where this is the case, cylinders of the proper material and ductility will pass our hydraulic test. If, however, they pass the weight test, and the metal is unequal or defective, then the hydraulic test will reveal it, and the cylinder will be condemned. The object of the test is therefore two-fold.

(1) It is a rough means of preventing light cylinders of hard unsuitable metal passing into use, and

(2) It prevents cylinders being destroyed under the hydraulic test, when there only fault is that they are too thin for the particular pressure we employ.

Such cylinders as these latter, of the lap-welded type, were in use just before the Brin Company started business, and for some time afterwards; and it may be asked why such cylinders as these are not filled by us to a proper pressure. There are two reasons for this. The first is that there are now very few of them remaining, and it would cause great confusion in our business to adopt even two different filling pressures, and the second, which is the important reason, is that in order to satisfy the railway companies to the safety during transit of all the cylinders bearing our text mark, they have requested us to submit to them a specification, giving not only our condition of testing, but also the thickness and quality of the material employed. We are, therefore, compelled to employ more stringent regulations, with a view to establishing absolute uniformity in accordance with the specification which we are now waiting to submit to the railway companies when called upon to do so. I may add that, through the intervention of the Board of Trade, it is probable that the railway companies will shortly revert to the carriage of cylinders by passenger trains, subject to all such cylinders being in suitable coverings or packing cases. The Board of Trade has informed us that they have advised this course, and we are told that the question will be settled this month. I see no reason why cylinder users should not be satisfied with this concession on the part of the railway companies. It may strike some of us as an unnecessary precaution with cylinders, such as I have described to-night, and if they were to ask us to do the same with regard to goods traffic we might reasonably complain, but this is not likely; in fact, I think it much more likely that when they are thoroughly reassured as to the safety of trade, the railway companies will revert to the old arrangement all round.

There is one other point with regard to the safety of cylinders on which I wish to touch, and that is their lasting qualities. It has been suggested that oxidation of the metal inside an oxygen cylinder must be very rapid. As a matter of fact, it is exceptionally slight. It is, I believe, a well-known chemical fact that carbonic acid must be present in the gas before any such action can take place. There is none in oxygen made by the Brin process, and this is probably the explanation of the fact that little or no oxidation takes place inside oxygen cylinders, certainly not nearly so much would have occurred in the same time under the varying conditions of the ordinary atmosphere.

Another more technical point in this connection which has recently been raised is that the working stress in the metal of solid-drawn cylinders of the sections I have mentioned is high and variable, and consequently liable in time to fatigue the metal. As some weight is lent to this by one of the recommendations (the only one with which I should be inclined to disagree) of Professor Goodman's recent report, we have taken the opinion of Professor Unwin—probably the highest authority in the Kingdom—on the subject. He considers a maximum working stress of ten tons per square inch on the thinnest section of the metal of a weldless cylinder as safe, so long as a suitable quality of steel is used. He recommended periodical annealing as a means for removing the effects of over-strain or fatigue, and he adds that he would prefer a reasonably high working limit of stress and adequate precautions to obtain suitable and ductile steel, rather than a lowering working pressure with less stringent precautions. I may say that the stress on our cylinders comes within the limit mentioned by Professor Unwin, and I leave it to you, gentlemen, to judge for yourself whether or not stringent precautions are taken. The compressed-gas trade is a comparitively young one, and there is much to watch in its development. The Bradford accident is, as far as I know, the first, and, with the present knowledge of the two recent accidents in America in my mind, I am strongly inclined to add, the only fatal accident which has yet occurred through a defective cylinder. It has taught us useful lessons, and called forth a great variety of opinion and suggestion.

It has been suggested, amongst other things, that the filling pressures of cylinders should be reduced, and I may say that it is a matter which has had our serious consideration. I have quoted to-night an opinion of far greater weight than my own, which, I believe, vindicates the filling pressure we employ, and justifies our action in thiswhole question. At the same time, if any authoritative or technical opinion were expressed as to the desirability of reducing the pressure, in order to give a still higher factor of safety, we would not ignore such a recommendation. No such opinion has yet, to my knowledge, been expressed, and I cannot help thinking that an unreasonable scare, rather than a technical knowledge of the question, has inspired most of the correspondence which has recently appeared on the subject.

The question of Government supervision has also again been raised, and the Board of Trade has been approached on the subject. There is every likelihood, however, of the matter being taken up by them, and, if they did, I fail to see where the public would benefit. It is just a case of shifting responsibility from one lot of shoulders to another, and, to my mind, it is far better to leave the responsibility in the hands of those to whom the safety of the trade is of the first importance. I have tried to show you to-night the precautions we employ to secure safety, and it must not be forgotten that we have the strongest incentives to adhere rigidly to these precautions in the fact that if there be an element of danger in the business it is in the compressing factories that far the greatest risk is run. We have a right to ask for co-operation on the part of cylinder users and if they, on their part, when purchasing cylinders, will insist on the sections I have mentioned as the minimum, also a reasonable test pressure of one and a half tons at the hands of the makers, and, above all, the requisite quality of steel, they may rest satisfied as to the safety of the business.

—:o:—

Size or Realism.

By Duncan Moore.

There is no doubt whatever but that the optical lantern has become of late years one of the most valuable accessories and aids to science by placing before those to be amused or instructed, pictures and diagrams, as well as living organisms, in a manner not to be approached by any other device whatever. Size and shape have perhaps more influence on the spectators of all pictures projected by the lantern than is always realised. Size, independent of anything else, has the power to affect an audience—or the more educated and intelligent portion of it—pleasantly or unpleasantly, as it may be suited to the subject shown.

Pictures exhibited much above their normal size have a more or less grotesque appearance, *especially* if containing figures. Landscapes pure and simple only on rare occasions give rise to criticism in this respect; but take flowers, figures, or anything of such dimensions that they can easily be compared or exaggerated. The screen proclaims their unreality, which is at once strikingly apparent. Objects represented less in size than they really are give no unpleasant sensation, and we look with satisfaction on things represented in the most miniature way imaginable.

We have, so to say, a scale of representation, with the optical lantern at one end, and the stereoscope of the other, the one attempting realistic pictures on a large scale, and the other on a small one.

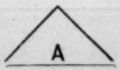
Now I would impress on amateur photographers that there is quite as much pleasure to be had out of stereoscopic slides as lantern slides, and that it is quite easy to be prepared to make stereo as lantern slides. Any apparatus suitable for stereo work is at the same time suitable for lantern negatives, therefore in setting up a kit I would advise the purchase of a suitable camera for stereoscopic work, with a pair of well-matched single landscape lenses. There is no objection to as many lenses of different foci as may be thought desirable. Why I mention single lenses is because with these nearly all subjects can be satisfactorily rendered, and with a brilliancy not to be exceeded by compound objectives. Of course rectilinear lenses are required for architectural subjects near at hand, whether interiors or exteriors, or when a number of straight lines come near the outside of the picture, otherwise the single lens answers every purpose admirably. The weight of the stereo camera is somewhat heavier than that of a ¼ plate, but not sufficient to be worth serious consideration. If lantern slides only happen to be required, then the stereo plate will take two. Different pictures and lenses of different foci can be used for each ½ plate if desired. The negative may be divided before development should there be any doubt about exposure, so there is neither difficulty or waste in using the larger instrument for lantern work. I would advise stereo pictures to be taken whenever they offer in preference to those suitable only for the lantern.

Stereoscopic work is now rapidly coming again into favour, and will with the advantages supplied by dry plates, and the wonderfully improved appliances introduced since its first popularity, not forgetting the advanced art education of the photographer himself, bids fair to be as popular in the future as it was in the past, and the slides produced as much better in proportion.

A brief sketch of how to make a stereoscopic slide may not be amiss. In the first place let the photographer disabuse himself of the idea that two pictures from the same negative, trimmed and mounted like a stereo slide will ever be stereoscopic. They may look like it out of the instrument, but not in it. This is one of the reasons that caused the decadence of its popularity beforetime. Neither can a stereo picture be seen stereoscopically with one eye, as many people will insist they can do; all they do see is a magnification of the image which will make it look more distinct in proportion to its magnification, that is all. However, it is astonishing the difficulty there sometimes is to make people think so.

A good stereo slide is undoubtedly one of the most beautiful of photographic creations, if not the most so that the art is capable of producing, and a thoroughly perfect stereoscopic transparency is of all photographic pictures the summit of perfection. I would therefore urge upon those who now content themselves with only lantern slide negatives to increase—not only the size of their apparatus, but the pleasure that will accrue to both themselves and friends by the examination of good and beautiful stereo work.

The price of the stereoscope is now so much less than it formerly was. A hand stereoscope may be purchased for a shilling or two that will answer very well, so half-a-dozen may be had with no great outlay, and do away with that tiresome waiting-to-have-a-look that always happens when only one instrument is available. Of course, the better the stereoscope the better the effect; still the cheap hand ones are not to be despised, and are most decidedly convenient.

Presuming the amateur has fitted himself out with the apparatus, a word or two how to use it will not be amiss. The difference between a stereoscopic and ordinary camera is that it (the stereo one) works with two lens simultaneously, and the body of the camera is divided into two chambers by means of an expanding septum. The pair of lenses are so arranged on the front that they can be more or less separated from each other. The wider the separation the greater relief will be given to objects in the picture, until distortion is produced. A square object, for instance, in the foreground will, when the lenses are too far apart be represented as oblong. Consequently an unreal effect is produced, the separation should be such that distortion is avoided, but the utmost relief short of this obtained. This kind of distortion is not observable in distant objects, therefore in many landscapes a greater separation of the lenses may be used with advantage than in nearer subjects, but as an effective stereograph should always include near objects, at any rate those not far removed from the foreground, the separation of the lenses is limited. Owing to the peculiar optical qualities of the combined images the most involved and intricate subjects that would make but very unsatisfactory ordinary photographs will make the most interesting stereograph, the confusion of detail that exists, in the single picture will assume a perfectly comprehensible form, and every interlaced twig or twisted leaf will assert its own individuality. An important condition in this work is having the camera perfectly level, so that the same objects in the foreground in each half will occupy exactly the same distance from the bare line in both It need not be said that the exposure of both must with moving objects be simultaneous. Shutters are constructed for this purpose, so no difficulty need be apprehended on this head. In development, both pictures are developed as one, the only extra care required then for other photographs is to make both ends of this plate of exactly the same density. When the prints are mounted the right hand one on the negative must be placed on the left end of this mount, and the left hand one on the right—in fact, just reversed. This is very important, or the stereoscopic effect will be changed to an intaglio one. Some printers get over this by cutting a piece of paper sufficiently long for two slides, and doubling each end of the strip back on itself to meet in the centre, as in the diagram  and then cutting in two at point A. After one side is printed turn over the paper, and print the other; by this means we get the printed halves in proper relation to each other. With regard to the width of stereoscopic pictures the height is of no particular consequence. They must not exceed $3\frac{1}{2}$-in. from the centre of one half to that of the other. They are generally made somewhat smaller, as this size completely fills the usual stereo mount to the edges. The prints may be cut down, but the same distance must be preserved between their centres. The final success of the operation hinges very much on the mounting, for if they are improperly done our previous care and trouble is only wasted.

Each half is quite as suitable for a lantern slide as though it was made on the orthodox sized plate. Providing only slides are wanted for the lantern. Each half plate can be exposed on a different subject, and in case of any doubt about exposure, the plate may be divided before development, and each treated as an independent picture.

As a rule, I am convinced that anyone who has once succeeded in making a good stereo slide will seldom be satisfied unless all his exposures are stereoscopic ones, and the little extra trouble involved will be disregarded. By following this mode of procedure we provide interest and amusement for both day and night for many at one time, and for each singly. For my own part I feel more pleasure in seeing a record of a holiday in the quietude of home than on the screen in public; but the actual things are so different, comparison is impossible. Each method has its good qualities, but there is a realism and refinement about the small production that is absent in the larger ones. It has been for years the dream of photographic scientists to combine the qualities of the two, and show a stereoscopic effect on the screen. The hope has been partially realized. One peculiarity of the stereogram is the extraordinary ærial perspective obtained, and the vividness with which all textures are rendered. Insignificant specks in a lantern projection, or in an ordinary photograph, may resolve themselves into easily recognised forms with an individuality of their own, in the stereoscope; and as the two kinds of slides (lantern and stereoscope) can be made with very little extra trouble, it seems a pity so few turn their attention to it.

A simple method of colouring lantern slides is by using thin washes of aniline colour, mixed with a little gum water on the cover glass, which can be rubbed off or re-applied at pleasure without interfering with the image in the least. A certain amount of variety may be introduced in this manner by changing the cover-glasses—a summer scene by daylight, or the same by moonlight, or any other schemes of colouring that may please the fancy of the artist. A very little practice is required to get really very effective pictures.

——:o:——

The Lanternist's Den, No. XII.

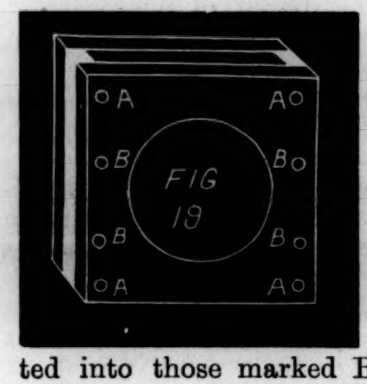
By C. E. Rendle.

How to Build a Bi-unial.—V.

We can, for the time being, put the lining on one side. Before doing so, however, perhaps it will be of interest to my readers to say I received estimates from three sources for making it up, and from twenty-five to thirty shillings may be considered a fair price providing its construction is similar to that here described.

Before commencing to polish the woodwork, we must make a couple of front wood blocks as follows, the description of course being for one block, which must be repeated:—

Cut two pieces of flat mahogany 6¼in. square and $\frac{5}{16}$in. in thickness. From the exact centre strike a circle 4⅝in. in diameter, also one 8¾in. from the same centre mark. This latter will be found to be a *broken circle*, which is just what is wanted, as it will only touch the corners of squares. Cut out the 4⅝in. circle carefully. Next prepare from a piece of ⅛in. stuff, two strips ¾in. wide and 6¼ long. These strips are to be glued between the squares so that the outside edges mitre, or come flush. First paint the strips with glue on both sides, place in position and screw into a couple of pairs of wood clams, one on each side, fix up fairly tight, and let them so remain until dry, when they can be taken out of clams and eight holes made with a $\frac{3}{16}$in. bit at positions shown at A A A A and B B B B (Fig. 19). Great accuracy is essential as to holes nearest corners, which are to be left open. Straight wood pins must be fitted into those marked B B B B and glued in, a tap with a mallet being given to each to drive tightly. When the glue is hard the ends of pins are to be cut off and papered down flush. Each corner also will require trimming.



To smooth inside of circle, take a piece of No. 1 glass paper in the right hand, lay it, as it were, flat in the hole, and give it about a dozen rubs round.

The flatted opening or slot will be found to measure, in width, ⅛in., and be 4¾in. long, this being the size of pass way wanted for curtain.

There are few amateur mechanics but have *some* knowledge of paint and polish, and every book, devoted to general subjects, naturally has a shake at a bottle of polish, and a stir at a pipkin of paint. At present the former only need be discussed, it being our intention to French polish the woodwork of the instrument. Spirit varnish — of which there are many varieties—is not sufficient for this purpose, for though its appearance is everything that can be desired, its lasting properties for knock-about wear are not good; it therefore behoves us to spend both time and attention in giving to the outside of the cabinet we have made a consistent coating.

The first thing to do is to make the wood polishable, which is done by checking its absorptiveness. Thoroughly smooth down with O. glasspaper, which may be lapped round small flat pieces of cork. This is a convenient method, for it not only applies to the ease of manipulation, but the after-results will be found more satisfactory. All little defects will show themselves, and should disappear, while this rubbing process is proceeding, and it is best to continue with it until quite a gloss is given to the surface. It may then be well dusted, and the filling or stopping commenced. The purpose of this may not be quite clear to the reader or worker, but it is nevertheless essential for the pores to be closed, if an unbroken polish is to be obtained. As an example of this, look at the case of a high-class piano, and then at that of the rubbish so largely advertised.—I will not libel the former by asking a comparison with the latter, for it is obvious that the one is as copper left from the file, while the other is as burnished gold. Hence the necessity for careful preparation.

Many means are adopted for this filling in, such as plasters, gum solutions of which shellac is an important factor, pumice, etc. The last named is the one chosen for adoption here, not for its superiority over others, so much as it is, perhaps, the best heat resister, and consequently not so likely to be affected.

Rub down some pieces of lump pumice quite flat, and if a square edge can be left on one side so much the better. Sprinkle some fine ground pumice on the part of the work about to be treated, and commence the rubbing lightly with a rotary motion. This can be continued until each part has been gone over several times, when the powder can by degrees be blown away, the parts can be dusted, and another slight rubbing given it with a fresh piece of pumice, and this time without the powder, finishing each portion of the work the same way as the grain.

It may be advisable to mention here that the whole polishing process should be conducted in an apartment having a perfectly dry temperature, and free from draught and dust.

The surface is now ready to receive the polish. Procure pale orange polish, half-pint; methylated spirit, half-pint; some wadding or flannel. The polish should be kept in the bottle though in use. Some clean pieces of linen rags and a little linseed oil will also be required.

With wadding or flannel — the former is recommended—make a rubber about the size of a walnut, apply to this some polish by tilting the bottle against it. Place into a piece of clean rag, and twist round at top so as to form a nob to hold it by. By the time this has been done the polish will have made its way through the rag, and the rubbing should at once be commenced to and fro the way of the grain, occasionally resaturating the rubber. After, say, the second application, the hand may take a semi-circular motion. Whenever the rubber appears to stick or clog, more polish is required, and the wad either placed in a clean part of the rag or a fresh piece used. A spot of linseed oil applied to the outside will give a free action. This must be repeated again and again, going over every part, first (as already mentioned) longways, then semi-circularly, and last with a circular movement, until a good polish is obtained. Having got thus far it must now be put aside for one clear day to harden, after which it will be observed the polish has dropped or sunk into the interstices of the wood, so that again the levelling process is necessary. Take, as before, some fine glass-paper and rub down until perfectly smooth again. Apparently only the bare wood will be seen when this result has been obtained, that is what is required. Repeat the polishing as before, commencing with a drop of oil on outside of rubber for the first two dressings; after that the finger may be wetted with oil and the rubber smeared over. When a fine surfaced polish has arrived, it can be placed in safety away from air and dust for at least three days to give it time to harden, when again it may be proceeded with. This time sprinkle over it—of course one side at a time—some of the finest ground pumice, and with a pad of chamois leather, wetted with water, the rubbing may be repeated until again an even face appears. Now use a clean rubber with some thinned polish—polish, four parts; methylated spirit, one part. Proceed with the polishing as before, but this time omitting the oil. As little pressure as possible is to be used. A looking-glass appearance is this time the result. Again it must be put aside to harden, previous to the spiriting or finishing off. This spiriting-off part of the work is not at all an easy matter to do properly, and much depends upon its success or non-success. It will be noticed that though the work has attained a high polish, there is something not quite right, else why these cloudy marks to the left, or those greasy spots to the right, and the smears in centre; they are traces of oil, and in first-class work are removed as follows: Prepare a rubber as before, apply to the wadding a *little* spirit, *very little*, and commence very lightly and quickly, round and round, never allowing the rubber to stop until it is dry, when it may again be moistened as before and the process repeated, until all traces of the oil has disappeared. The last touches with the rubber should go longways of the work.

This, no doubt to many will suggest a wearisome job, but it is not so, and if the instructions given above are followed in detail, the results are sure to be successful.

(*To be continued.*)

:o:

Herapath's Polarising Plates.

In relation to the difficulty of obtaining polariscopic analysers of no intrinsic value, to be distributed among large auditories during the exhibition of stereoscopic lantern projections, the making of Herapath's crystal plates of a salt of quinine has already been described in these pages. Although the materials are worth nearly nothing, considering the almost entire absence of weight in the crystals, the process of making the crystals and mounting them appears to be difficult according to Herapath's printed account, although it may or may not be so practically.

Ordinary crystals of the salt itself are easy enough to produce, so perhaps some readers may like to obtain them in the first instance, and afterwards try to produce them in a form suitable for polariscopic work, by some method of their own, less complicated than that employed by Mr. Herapath; therefore the general description of the ordinary crystals, by the late Professor W. Allen Miller, will now be given. He states that they are obtained by dissolving the acid sulphate of quinine in concentrated acetic acid, and adding to the heated liquid an alcoholic solution of iodine, drop by drop. "After standing for a few hours, the salt is deposited in large flat rectangular plates, which, when seen by reflected light, are of a brilliant green colour, with a metallic lustre, like the wing-cases of the blistering beetle. When viewed by transmitted light, they appear to be of a pale olive tint, but the light so transmitted is perfectly polarised, so that if a second plate cross the first at right angles, the whole of the light is as completely arrested by the overlapping portions, as it would be by two overlapping plates of tourmaline, the axes of which cross each other at right angles." These words were written by Professor Miller in 1866, more than ten years after Herapath announced his discovery, and the former says nothing about producing the floating crystals, he writes as if the ordinary crystals at the bottom of the solution would do. If so, it is a blessing, but it must be remembered that his serious omission of mention of floating crystals may have been due merely to the necessity for brevity when dealing with one salt in a book on general chemistry.

Considering the priceless value of a complete set of the volumes of *The Philosophical Magazine*, and the few public libraries in which they are to be found, we now select and abridge a few more useful particulars from the articles by Dr. Herapath in that periodical, as to the details of his method of making the crystals for polariscopic purposes, for the benefit of our readers who have not access to the original volumes.

Among the minor precautions mentioned by Mr. Herapath in his article in *The Philosophical Magazine* of November, 1853, is that each flat crystal when taken from the surface of the liquid and placed upon a glass plate, must have the water most scrupulously removed by touching the glass with pieces of blotting paper, without touching the crystalline surface, as the least contact therewith does mischief; afterwards the crystal is dried in a room at a temperature between forty degrees and fifty degrees Fahr. He says that sometimes it is necessary to dip it for an instant only in a little cold distilled water "somewhat imbued" with iodine. The power of polarisation of a crystal is often materially increased by placing it dry under a cupping glass near a watch glass containing a few drops of tincture of iodine; an exposure thus to the vapour for about three hours, at a temperature of fifty degrees Fahr., is usually necessary. If too much iodine be used, the plates will become brittle, and too yellow.

Thin, very fluid Canada balsam is used to mount the finished crystal upon glass, for much heat must not be employed; he believed it best to use the balsam when fluid at ordinary temperature. As the balsam appears to attack the crystal and dissolve out the iodine, he first saturated it with iodine at little more than the ordinary temperature, by warming some of the balsam in a test-tube, dropping into it some crystals of iodine, agitating them well with a glass rod. After giving time to cool, and the excess of iodine to subside, it is fit for use. He usually employed a solution of hard old balsam in ether, and added the iodine thereto.

In relation to the second formula by Dr. Herapath, republished in these pages recently, he says that he has succeeded in making crystals of large size by replacing the spirit of wine therein mentioned, by an equal quantity of hyponitric ether; with the latter the crystals will float for a week upon the surface without showing signs of degradation.

Sometimes in making the crystals, the free iodine disappears too readily, leaving the solution nearly colourless, and then the required compound does not form. The remedy is to add enough additional iodine solution, so that the liquid shall retain its dark sherry colour during the cooling. After making the addition of tincture of iodine by either of the two formulæ which we have published, it is necessary to continue the heat of the spirit lamp for a short time, to dissolve all the cinnamon brown iodide of quinine first deposited, so that the solution shall have a clear, dark sherry colour, then it should be filtered into a perfectly clean vessel. The liquid must be absolutely free from specks of foreign matter, as they would form nuclei for irregular crystals. Herapath lost no quinine in his experiments; he recovered by chemical means all that was contained in his waste products.

In May, 1855, Dr. Herapath published in the *Philosophical Magazine* the third of his memoirs on the same subject, and therein he gave the following particulars about this peculiar salt of quinine:—Its specific gravity at sixty degrees Fahr. is 1·895. It is sparingly soluble in ether, turpentine, or water at ordinary temperatures, to the extent in water of scarcely more than $\frac{1}{2000}$ part; boiling water does not dissolve $\frac{1}{1000}$ part. Alcohol of 0·837 dissolves $\frac{1}{650}$ part at 570 Fahr.; and by boiling it takes up $\frac{1}{50}$ part. Acetic acid of S.G. 1·042 dissolves $\frac{1}{750}$ part at sixty degrees Fahr., and $\frac{1}{80}$ part at boiling temperature, iodine evaporating if the heat is prolonged.

In 1855, Dr. Herapath investigated some compounds of iodine and strychnine, and communicated the results to Professor Stokes of the Royal Society. Some of these compounds possess peculiar optical properties.

The name sometimes given to Herapath's quinine and iodine crystals of "artificial tourmalines" is good in one way and bad in another. It accurately describes their external forms as flat plates, and how they act upon light. The fault is, that the name may sometimes induce those who do not know what real tourmalines are, to think that he produces the real thing by artificial means. Herapath's crystals being composed mostly of organic substances, must be more perishable than mineral tourmalines.

As forty years have elapsed since Dr. Herapath began producing the crystals, something must now be known as to their permanency in the mounted form, and their merits and defects in resisting the influences attacking them during the lapse of time. Perhaps some opticians, and others among the readers of these lines, will kindly furnish us with any experiences they have had on these points.

The First Lantern Show in the Royal Albert Hall.

On January 11th, on the occasion of Dr. Barnardo's annual meeting, Messrs. D. Noakes & Son, of South London Optical Works, Greenwich, were engaged to illustrate this philanthropic work, by projecting photos on the screen of the various homes and works controlled by him, and for the first time in the history of the Royal Albert Hall a lantern show was conducted within its walls.

The difficulties imposed upon Messrs. Noakes & Son were great. The exhibition was timed for 4.30 and the roof of the hall is composed of glass, and, the day being exceptionally bright, the interior of the hall was far from dark when the time for the lantern pictures came round.

The lantern could not be fixed in the arena, as that was required for the athletic manœuvres of the young sailors, soldiers and gymnasts of Dr. Barnardo's establishment.

The lantern could not be placed in the gangway leading to the arena, as Royalty with their escort would have an obstructed passage. There was only one alternative under the circumstances, and that was to go into one of the galleries.

Another difficulty existed in the fact that Messrs. Noakes & Son were only filling one item in a large programme, and it was a necessity that the immense screen used should not be covering the organ and orchestra except during the lantern show.

The exhibitors, with their large practical knowledge, were equal to all the difficulties. A special set of lenses of 15 inch foci, or, as they prefer expressing the term, of 5 diameters of the disc, were manufactured. The lantern was fixed in one tier immediately over the gangway at 190ft. from the screen. The pictures when focussed on the screen were 36ft. in diameter, and, making reasonable allowance for the light present in the hall and the dust in the atmosphere raised by the athletic sports and several other considerations, the screen results were certainly admirable. The dust of the atmosphere and the long distance between lantern and screen gave the pictures a weird effect as if hung in mid-air and projected without the assistance of a screen. On each of the pictures was painted in bold type the name of the scene, the exhibition forming an excellent object-lesson as to the very successful methods adopted by Dr. Barnardo. One of the greatest difficulties Messrs. Noakes & Son had to contend with was hanging the screen so as to be out of position except during the lantern item of the programme, and this was done in a somewhat ingenious manner and certainly with the minimum of the expenditure. A line previously tested to ½ ton tensile strain was stretched from one gallery to the other immediately in front of the large organ. The sagg of the middle, being strained out by two stretching lines taken to the sides, and being strained into a nearly straight line, was utilised as a runner on which a flexible screen of a linen finish was suspended by means of rings, each of which were tested with their connections to a strain of 45 lbs. each and every precaution adopted to avoid the slightest hitch or accident during the exhibition.

A double set of running links and small pulleys were arranged so that the screen could be pulled to one side of the hall when not required and to a certain central position when required for use, this central position being guaranteed by certain stops on stretching lines affixed to the screen. The plan proved most successful, and from the time the signal was given to the time the screen was in position ready for using was less than one minute, all that was required being to pull one running line and make fast one stretching line. Of course, it is almost needless to say that Messrs. Noakes used their compound chamber jet. The mixing chamber is divided into two, which principle insures perfect mixation; and the best encomium upon their performance is that lanternists in the audience placed orders for similar apparatus, and when we find that the actual instrument used is on sale for £50, with jets and patent dissolver complete, it augurs well for lanternists with small purses wishing to do high-class work.

:o:

Editorial Table.

Tinted Cover Glasses for Lantern Slides.—To enable one to tint a lantern slide in two seconds, Messrs. Butcher & Son, of Blackheath, have introduced a novel form of cover glass. These glasses are coated with delicately coloured lines or bands, which impart to the slide with which they may be mounted, a very pleasing appearance. As each cover glass is supplied with the binding strip fastened on it, they are quickly attached to any suitable transparency. The sunlight effects are produced by having a blue sky at the top, gradually softening off to clear, or slightly yellow for the horizon, and then becoming stronger in a reddish yellow for the foreground. The sunset effects are produced by having a blue sky at the top, with a sun reflection just above the horizon, and with a corresponding reflection in the foreground. The water effects are produced by having a blue sky at the top, gradually softening to the horizon, and having a greenish blue foreground.

Yachts, Ships of War, and Naval Subjects.—An extensive business in photographs and lantern slides of the above subjects is carried on by Messrs. G. West & Son, Palmerston Road, Southsea. From lists we have received from them, we learn that they have a full line of photographs of battle ships, cruisers, belted cruisers, torpedo and gun boats, troopships, training brigs, wooden ships, effects of torpedo warfare, foreign fleets, manœuvres and gun drill, and a host of other subjects, including a panorama in six sectional photographs of Portsmouth and its surroundings. In the way of yachts, everything of note seems to be included in their lists. The marine studies of Messrs. West & Son are of a most complete order, and nearly fifty medals have been awarded to them.

PLATINO - BROMIDE PAPER.—The Eastman Photographic Materials Company have lately introduced this new paper. Prints produced on it have a fine tone of velvet appearance with a dim surface, presenting a similar appearance to platinum prints. Prints, or enlargements, may be made quickly by artificial light, as the mode of manipulation is similar to that employed with their bromide paper. Metol is recommended as a good developer for producing soft and pleasing effects with this new paper, which will doubtless become very popular.

HANDBOOK OF DEVELOPERS.—This handbook of Dr. Andresen's has been received from Arthur Schwarz & Co., of Dashwood House, New Broad Street, E.C. In it full particulars pertaining to the uses of the patent developers issued by this firm are given. Various formulæs are also given, and a few pages are left blank to be used as an exposure table. Anyone may possess this book, as it will be sent free on application to Messrs. Schwarz.

THORNTON PICKARD MANUFACTURING CO.'S CATALOGUE, which has lately come to hand, is of special interest. Of course it contains particulars and prices of the various cameras, shutters, and stands for which this firm are justly famed, but it also contains a number of fine illustrations which show with what rapidity their apparatus will work. The illustrations are of high class, and include two entitled "Coaching in the Lake district"; and four in connection with the game of cricket, illustrating bowling and batting, in each of which the ball, although in rapid motion, is distinctly depicted. A picture illustrating water being thrown from a pail is one that cannot fail to be of interest. Several pictures are also given of buildings at the Chicago Exhibition, also athletic sports. The fineness of the illustrations will ensure the catalogue being kept in a prominent place by those who may be fortunate enough to get one.

MAWSON & SWAN'S PLATES.—We have received a few packets of plates from this well-known firm. Several brands of plates are manufactured by them according to the class of work for which they are required. For the studio or ordinary landscape work the "Castle" plate will be found excellent. For interiors, instantaneous, and hand camera work, the brand known as the "Mawson Celeritas" will be fonnd suitable; these latter are coated on celluloid as well as glass. Plates backed with paper are also manufactured by this firm. Having obtained a negative, it is a simple matter to take a transparency on the "Mawson" lantern plate. A variety of other plates are also made by this firm, including bromide opals, stellar plates for astronomical work, photo-mechanical plates for photo-lithographers and etchers. For enlarging or other work, the "Mawson" bromide paper may be obtained either in cut up sizes, or, if preferable, in bands. For the guidance of those using these plates, books of instructions, of neat appearance, and giving full working details may be obtained on application.

THE VEIL LIFTED.—London, Whittaker & Co., 2s. The publication of this illustrated work of 164 pages has created a wide-spread interest in the subject of "Psychic Photography." It contains particulars of a series of experiments conducted under strict conditions by Mr. J. Traill Taylor; a paper on the same subject by the Rev. H. R. Haweis, M.A.; copious remarks by Mr. Jas. Robertson, of Glasgow; and miscellanea by the editor, Mr. Andrew Glendenning. The subject is one that requires, in the face of public opinion, a good deal of courage to publicly speak of, and it is to be hoped that a careful perusal of this book, which contains contributions from reliable and honest men, will do much to stimulate investigators.

SLIDES.—Seldom have we seen in one lot a finer collection of slides than those sent by Mr. Graystone Bird, of 38, Wilson Street, Bath. We have received several, including views in the neighbourhood of Lynmouth, East and West Lyn, also a few excellent frost scenes, and some studies of little children in their shifts. It would be a difficult matter to beat either for pose, expression or tone. The words artistic and beautiful truly describe such slides of Mr. Bird's that we have seen.

:o:

Correspondence.

STEREOSCOPIC PROJECTION AND METAL FACED SCREENS.

To the Editor.

SIR,—In your February issue, Mr. Fred E. Ives takes exception to Mr. Harrison's reference to my silver-faced screen as "one portion" of my invention, and goes on to state that he (Mr. Ives) "was under the impression that the matt silver screen was all that was original with Mr. Anderton." Further, Mr. Ives endeavours to convey the impression that I stole from him the idea of obtaining stereoscopic projection by means of polarised light. It may comfort that gentleman to learn that at the time of his experiment and its failure I was unaware of his existence, and that by his declaration in your issue of February, 1894, I was first made aware of his trial. It may also delight him to know that prior to the date he gives, viz., March 23rd, 1891, I had made countless experiments, and succeeded in obtaining stereoscopic effects from polarised projected pictures. Mr. Ives further says: "Although I discussed my experiments freely with several friends, I did not publish them." He therefore would have your readers infer from this statement that winged messengers, waiting on the breath of genius, sped from America and spread themselves over Europe to tell the tale of his great trial and its dismal failure. How refreshingly modest of Mr. Ives.

Yours very truly,
JOHN ANDERTON.

142, Suffolk Street,
Birmingham.

COMPRESSING COAL GAS AT HOME AND SATURATORS.

To the Editor.

SIR,—It would no doubt be a great boon to lanternists to be able to compress their own coal gas, and thus save expense; but if your correspondent "Henry" will work it out, he will find it rather impractical.

Take for example the quantity he suggests, viz., 20 cubic feet or 34,650 cubic inches, to be compressed to 120 atmos. or 1,764 lbs. per square inch.

Now the largest pump to work by hand for such a pressure could not have more than one square inch area of plunger, and would have to be made so that the leverage could be increased as the pressure increases. This means shortening the length of the stroke of the pump, so that when the maximum pressure was reached it would only be about one inch, but the average length of stroke would be two inches. Thus the amount of gas compressed per stroke would be two cubic inches or 17,280 strokes for 20 cubic feet. This, at fifty strokes per minute (a good average), would take 345 minutes or 5¾ hours constant work, and that not too easy; this is without allowing for any loss by slip of leakage, which would not be an inconsiderable item. The cost of such a pump would be about £12.

By means of stage pumping: that is, pumping from a larger pump, working at comparatively low pressure, into a smaller one compressing to the maximum pressure, the time would perhaps be shortened to two hours, but it would mean hard work. Such a machine would cost at least £30. I am afraid we should have to use a lot of gas to pay for pumps alone, let alone the expenditure of time.

By compressing the gas to a lower pressure only, say to 60 atmos., it might be a little more workable, but then we should only get 10 cubic feet into a nominal 20 feet bottle.

A few words about saturators. About fourteen years ago I tried saturated coal gas in a lantern in much the same way as described by Mr. Timberlake, with much the same result, but thought the idea was original until I read his article. As to using saturators with oxygen I have also had some experience in this line, and so perhaps may be allowed to give a few cautions, both as a lanternist and also as a chemist, to those about to experiment with saturators. I do not here refer to the commercial forms which I believe to be perfectly safe when used with ordinary care, but to experimental forms of one's own devising or construction:—

1. Keep the reservoir as small as practical.
2. Keep the saturator as far away from you as convenient, and if possible cover it with a basket during the experiment, until you are satisfied with its strength and behaviour.
3. Be careful to turn off the supply at jet before turning off supply of oxygen to saturator.

I might add that if the liquid in the saturator be used in a free state (I mean if there is no material inside to absorb the liquid, which I think there should be), it would be as well to keep some sand handy in case of spilling and fire.

I do not wish to frighten anyone by the above, but rather to enable them to carry out their experiments without risk or fear.

Believe me,
Yours truly,
W. J. COLES, A. M. INST. C. E.

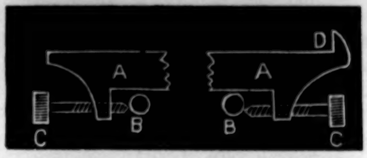
20, Elm Grove, Peckham, S.E.

REGISTERING LANTERNS.

To the Editor.

SIR,—In looking through the back numbers of "our" journal, I have been much struck in those articles which have appeared from time to time respecting the registration of lantern stages and the runners used in connection therewith, with the great stress laid upon the absolute necessity of having raising screws fitted to the runners. Messrs. Norton, Stoffell, Baker, Walker, and others, all specially draw attention to this, and enlarge upon the particular method adopted by themselves to attain this purpose. My object in troubling you with this letter is to ask the actual reason of this, to me, needless complication, and whether it is really so very essential to correct registration?

My own lantern (by Noakes) has no such arrangement, nor do I in any way experience the slightest trouble or inconvenience through its absence. I subjoin a sketch of my runners:—



In above A A is the runner, B B the pillars on which the runner rests, C C adjusting screws, and D the stop.

It will be observed that they are only provided with screws for *lateral* adjustment, the *vertical* adjustment I obtain solely by manipulation of the nuts and clamping screws connected with the fronts of top and bottom lanterns, yet I can state from my own personal and practical experience that having used my lantern at all distances from the screen, with objectives varying from 6 inches to 15 inches, I have never had the slightest difficulty in most accurately registering my slides and effects—of course I make use of crosses or templates when setting up.

All my registering is done at home in a small room, using 6 inch objectives at about 10 feet from the screen, yet effects so registered come on dead true with 15 inch objectives at some 100 feet or so distance. If this is so with my lantern, surely it must be the case with others? Why, therefore, the necessity of using raising screws, causing extra trouble and expense without any commensurate gain?

As I am writing purely in a spirit of enquiry, and not with any intention of laying down the law, I should esteem it a great favour if you would kindly insert this letter in your next issue, so that I, and your readers generally, might have the benefit of any criticisms or opinions of other contributors and experts on the subject.

I am, dear Sir, Yours truly,
"PERPLEXED."

Re ASKEW LANTERN BOX.

SIR,—It is not our intention to carry on a lot of correspondence with the idea of proving that your correspondent Mr. W. D. Askew, is or is not the inventor of the box described in his patent specification; probably this is his first experience with the Patent Office, and he is delighted to think that he is now classed as an inventor.

At his own invitation in your paper (wherein he states that he made application to us, as also to over a dozen other firms, asking if a portable lantern stand could be supplied), we think the easiest plan would be to give you a copy of a letter which is signed E. Askew, and which gives us no clue as to his idea of designing the box he patented. The letter is dated 19th February, 1892 (and not the autumn of 1891, as he states), and reads as follows:—

"What is the diameter of your No. 1 circular tripod "head? I want a circular head 6 or 7 inches in "diameter, and a good, firm, folding tripod for support-"ing a lantern apparatus; something about 5 feet high. "What could you do it for?"

As we did not exactly understand Mr. Askew's requirements, we sent that gentleman a quotation for what we thought he required, also a sketch. Our reply read as follows:—

"A No. 1 circular tripod head is only 4½ inches in "diameter; we could supply a good strong folding tripod "for 25/-, but if you wish to use it for lantern purposes, "it would be necessary to insert the revolving head in a "hinged board, so that the lantern could be elevated at "will, this would make an additional cost of about 7/6. "We could also supply a teak studio stand, with tilting "board and elevating pedestal, price 27/6."

These letters are the whole of the correspondence, with the exception of a post-card from Mr. Askew, acknowledging sketch, for which he thanked us, and asking us if we were open to purchase a patent for a lantern box, which we could not undertake to do without knowing of what it consisted. To our letter requesting information on this point Mr. Askew did not reply, and up to last week we were quite ignorant of his claims. We would ask Mr. Askew if he considers he is entitled to the honour of inventing a tripod for the use of the lantern, also to the revolving of the lantern box with a McKellan turntable. We notice in Claim 4 that the chief thing claimed is, that by the elevation of the tilting board it creates a better draught for the lamp. There are nine claims in all, and we doubt very much if any of them are worth the paper they are written upon. Probably he is unaware that some fifteen years ago the Scioptican Company introduced a lantern box with let-down sides, moreover, about the same time Mr. W. I. Chadwick, of Manchester, made a similar case for the Manchester Photographic Society.

When we made our box, it was intended entirely for our operator's own use, as we arranged it to take not only the lantern but tools of various description, and all the necessary sundries for use when preparing for an exhibition. At the time, we did not attach much importance to it; it was only at the request of a number of our customers that we had an idea of placing the box and tripod upon the market.

We think that, under these circumstances, it is more probable that it is Mr. Askew, and not us who are the copyists.

We are, dear Sir,
Yours truly,
SHARP & HITCHMOUGH.

Dale Street,
Liverpool, Feb. 10th, 1894.

—:o:—

Notes and Queries.

F. M. Beaumont.—Your inquiries with respect to colouring are not very explicit. It is a matter of practice to get a smooth surface. You do not say with what you mix the colours when speaking of the slide being wet after ten days. You also ask in what manner the methylated spirit should be mixed with the oil paint. Are you not thinking of varnish instead of spirit? You can get varnish colours in tubes, and will require turpentine, copal and mastic varnish, gold size, and pale drying oil. If you send to Barnard and Son, whose address you will find in our advertising pages, for their shilling manual on painting on glass, you will get much valuable information on the subject.

C. S. Scott.—We have seen Mr. Clarkson, who has replied to your letter.

Jex Bardwell.—Thanks for your letter. We have pleasure in calling attention to the club on another page.

Jas. C. Christie.—Both of the lamps you mention give good lights. We do not give an opinion as to which of any two apparatus of the same kind is the better. All oil lamps require careful and patient adjustment in order to get their best light from them.

B. R. writes:—I bought a gas cylinder some time ago and have had it repeatedly filled with oxygen at Brins'. A short time ago I again sent it, but it was returned with a note saying that they could not fill the make of which mine happens to be any more. Then I applied to Mr. Clarkson, and I got much the same reply. Can you tell me what it is all about, as neither assign any definite reason?—*Ans.*—Your cylinder is evidently of that kind described as of the Bradford type, a kind which both of the firms at present declined to fill.

W. J. Coles.—We shall be pleased to have the article on the subject you mention.

A. M. H.—(1) About 4ft. of oxygen per hour. (2) Ether is continually being sent by rail. (3) It can be purchased in any town of any pretensions. (4) It will evaporate quickly if the cork or stopper is left out of the bottle. (5) Single saturators weigh from 2½ to 5 lbs., according to make. (6) Yes, you can recharge in the manner you suggest. (7) The light is about equal.

E. P. S.—Your letter was forwarded to Mr. Medland as requested.

Cross writes: Do I run any risk of having proceedings taken against me if I continue to use my gridiron saturator, which I find an excellent means of getting a good light for my lantern? I am anxious to know this, because a friend of mine told me that someone was going to stop people from making or using certain saturators. As my saturator not only has a very scientific appearance, but also answers my purpose, you can understand my wanting an opinion from a reliable source.—*Ans.*—We consider that you run no risk whatever, and that you may continue to use it.

Robt. Horton.—You state that you were at the meeting. Why, then, did you not ask the question at the time? If the ether is done, the light will simply go out. You will find a verbatim report in this issue.

Ajax.—Thanks; the matter shall have attention.

H. Cooper.—1 and 2 are about equal, and better than 3.

Damar Varnish.—J. Diggle and others..—Several correspondents have written to say that thereis no such varnish as Damar varnish, but we still maintain that it is procurable—in fact, we got a bottle of it a few days ago from Bernard & Son, 19, Berners-street, W.

E. Baker.—The Mason & Payne style of opaque screen is now the property of W. Gill & Son, 13, Warwick Lane, E.C.

S. R. (Tarkastad, S. Africa).—Either of the three will answer well, but we cannot say that one is better than the other.

J. Diggles.—Get Mr. Newth's book, "Chemical Lecture Experiments." It contains a number of experiments suitable for the lantern, and is published by Longmans, Green & Co.

J.W.C.—1. You can, when using the train slide, produce the puffing noise by rubbing two sheets of glass or sand paper together quickly. 2. The whistle is best produced by blowing over the end of a tube, a plunger being fitted with a rod to slide up and down so that the tone can be made to increase from a low to a high pitch.

Archer & Sons.—In our next; no room in this issue.

D. Noakes & Son.—In our next; no room in this issue.

T. Fletcher.—In our next; no room in this issue.

—:o:—

A FIVE-FOLD INCREASE.

In a letter from Mr. Bishop Dockett, of 65, Junction Road, Upper Holloway, he says—

SINCE ADVERTISING IN THE "OPTICAL MAGIC LANTERN JOURNAL AND PHOTOGRAPHIC ENLARGER," I FIND MY BUSINESS HAS INCREASED AT LEAST FIVE-FOLD.